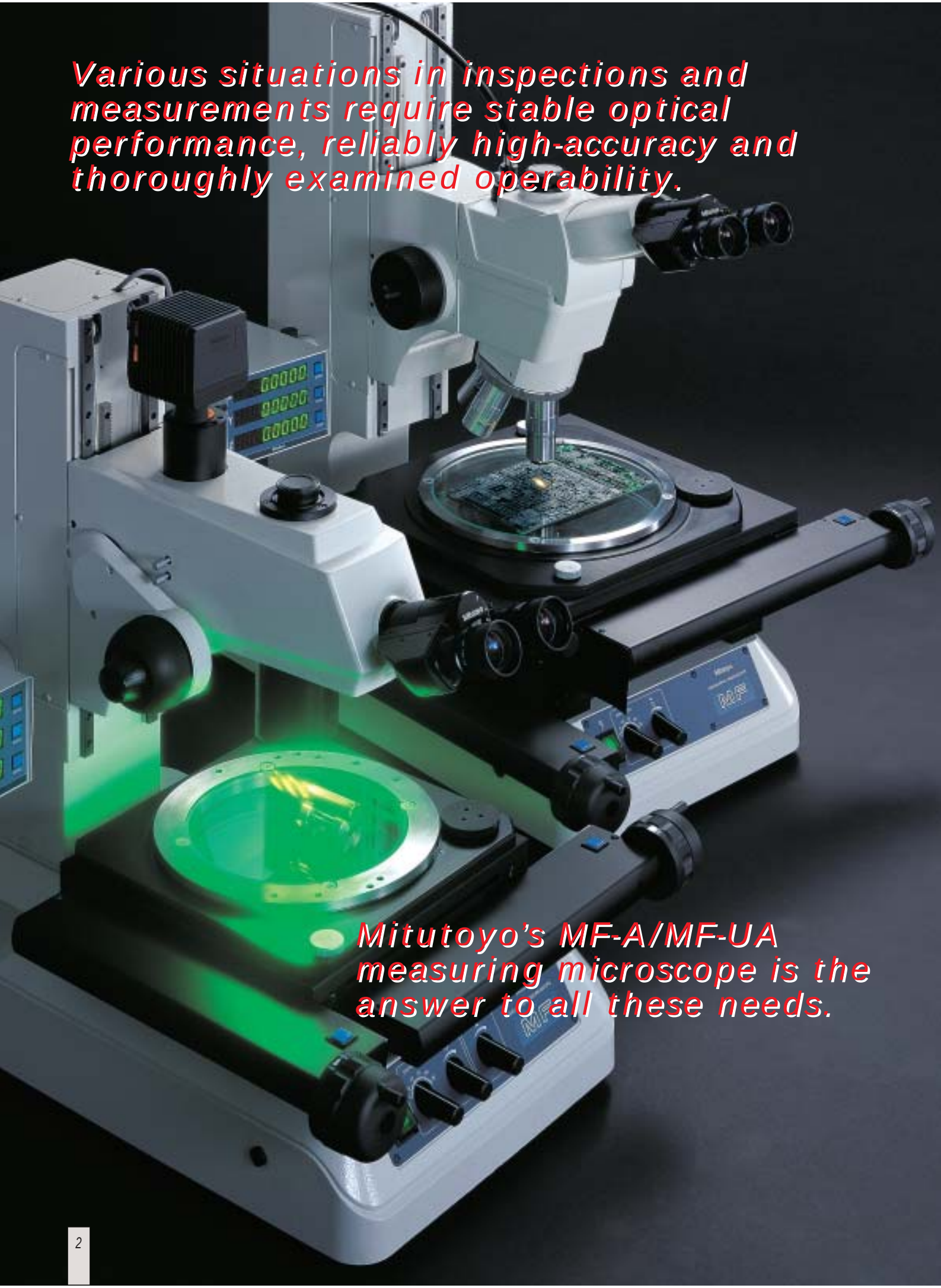
CATALOG No. E4153-176

Mitutoyo

MF-A/MF-UA

Measuring Microscopes


Various situations in inspections and measurements require stable optical performance, reliably high-accuracy and thoroughly examined operability.
Mitutoyo's MF-A/MF-UA measuring microscope is the answer to all these needs.

Mitutoyo's optical, machine and electronic technologies have succeeded in further developing today's measuring microscopes.

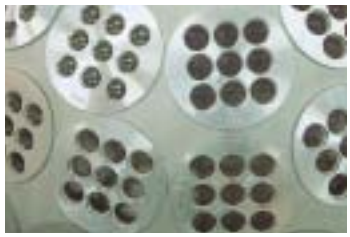
Mitutoyo considers that, in order for an individual to feel comfortable operating a microscope while also achieving highly-efficient measurements, the balance of the components that constitute the main body of the microscope is the key factor. The lenses, which are vital to a microscope, a body of high-rigidity, a high-accuracy stage, and high-accuracy digital scales are the most important components of a microscope. Mitutoyo takes pride in taking the responsibility to support its industrial mother technologies. This sense of responsibility, backed-up by our belief in the importance of individual components, manifests itself in our continuous pursuit of better components to provide sophisticated measuring microscopes of a high quality.

Mitutoyo's ISO9000 series certified factories in Japan perform daily quality controls and quality assurances. Mitutoyo's measuring tools and instruments are traceable to the national standards, and we provide calibration services and accuracy maintenance, issuing certificates of accuracy, as well.
In addition, Mitutoyo's three sales offices (Kawasaki, Utsunomiya and Hiroshima) have been certified ISO14001, for their efforts in maintaining the international standards of environmental management.

Concept and design, manufacturing and evaluation of the microscope's main body and components

Development and design, manufacturing and evaluation of the optical system and lenses

Development, manufacturing and evaluation of the high-accuracy digital scale

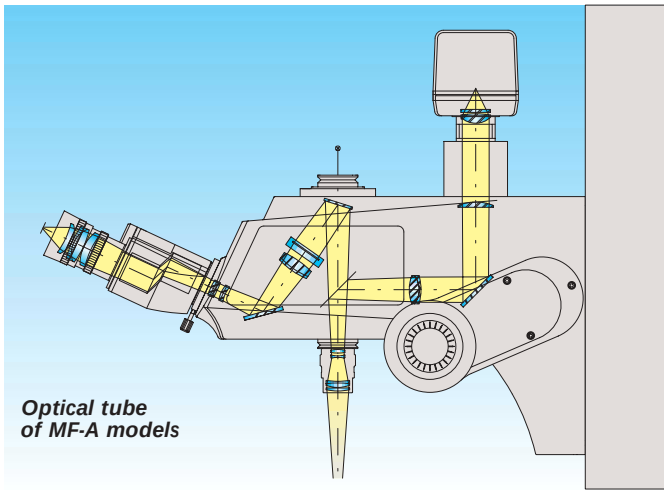


The bodies of the MF-A/MF-UA measuring microscopes are highly rigid and are equipped with stages of various sizes, to provide the best measuring environments for various types of workpieces.

Inspection performance

Clear, bright image, at low to high magnifications
Smooth focusing with a light touch

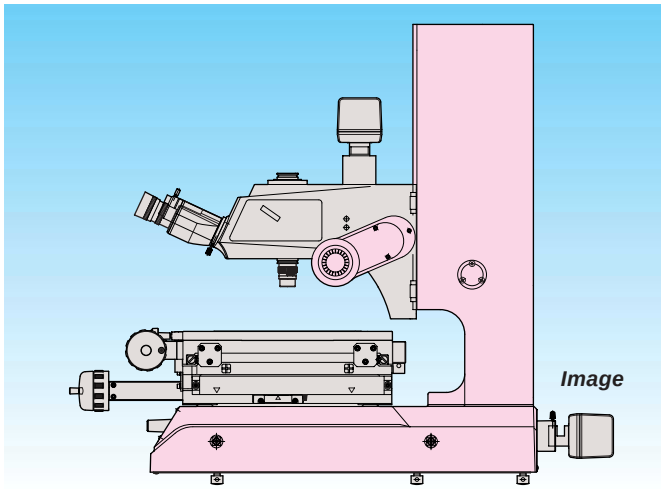
Presents fine details



With improved lighting efficiency and greatly reduced flare in the optical system, the MF-A/MF-UA presents the workpiece details in clear and bright images. In particular, the MF-UA measuring microscopes employs the same metal microscope head as the one used in the popular FS series Finescope, to provide a bright image with excellent color reproduction with the three primary colors corrected. (The FS series objective lenses have plan apochromat specifications.)*

** Curve aberration in the entire image area and chromatic aberration in the wavelengths of the three primary colors (blue, yellow, and red) are corrected.*

Body with high-rigidity



In order for the operator to be able to inspect or measure a workpiece with a microscope at a desired total magnification, whether it is a low magnification or a high magnification, a microscope body with high-rigidity is an absolute necessity. The base, on which a long stage is placed, also requires high-rigidity.
In the developmental stage, the MF-A/MF-UA measruring microscopes were repeatedly tested in drop tests, transportation tests,* as well as smoothing tests in order to prove their durability against shocks and wears and to achieve a sharp, clear field of view and stable accuracy.*

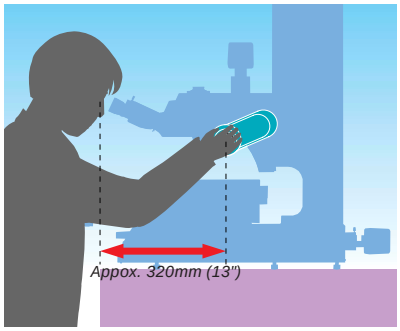
** Those tests were conducted in methods which were Mitutoyo's own, and the microscopes tested were in their individual crates.*

Eyepieces with a wide field of view

*The eyepieces of the MF-A/MF-UA, which have the field number of *24 mm (10x), the largest number in their class, provide a wide field of view to reduce eye fatigue that accompanies a long inspection time.*

** A range of workpiece area that can be observed in the entire view field with a use of 1x eyepieces.*

Light focus system



MF-A models

As a standard feature, the Z-axis handle grips are placed on both sides of the column to allow the operator, whether the person is right-handed or left-handed, to measure with efficiency. A workpiece with a step, for example a mold, requires a larger (vertical) focusing movement. The Z-axis focus system, which supports a maximum workpiece height of 150mm/220mm(6"/9"), employs a balanced-weight method to allow the lightest and smoothest focusing. The stroke distance per revolution is designed to be 30mm(13"), to allow for quick focusing. The focus handle grips, which are made of rubber, are placed at a distance of approximately 320mm(13") (MF-A models) from eye level, an ideal position for anyone to operate comfortably.

The optical system, with little flaring, a wide field-of-view eyepiece, and a long working distance objective lens, supports inspections and measurements with ease.
The MF-A/MF-UA measuring microscopes' expandability, such as when used in combination with Mitutoyo's vision unit to boost its performance or data management on a PC, promises further improved measuring efficiency.

Measuring performance

Measures from minute to long-size workpieces.
Faster digital measurement.

Digital readout of 0.001mm

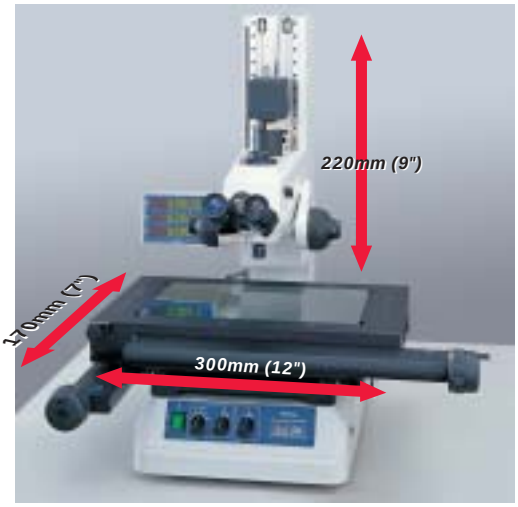
The resolution of the counter (two-axes and three-axes are available) is selectable from 0.001mm, 0.0005mm, and 0.0001mm(.0001"/.00005"/.00001") to allow measurements with high-resolutions. Zero-set, Direction Switch, and Smoothing are standard functions. (Zero-set can be executed by a switch on the focus handle.)
For data output, the counter is equipped with an RS-232C interface, which is most commonly used for data output to a general-purpose printer or to a PC. The counter can be mounted on either the right or left side of the column.

Front panel

Rear panel

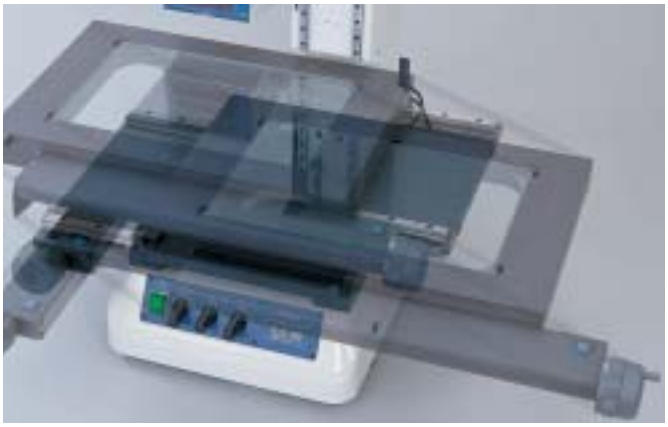
The longest measuring stroke

The dimension of workpieces varies from minute to long. Measuring microscopes, which are used in many different fields of industry, are required to support a wide range of applications, regardless of the type of field. The MF-A/MF-UA measuring microscopes allow long-stroke measurements up to a maximum of 300mm (X-axis) x 170mm (Y-axis) x 220mm (Z-axis) (12"x7"x9"). These microscopes are equipped with the swiveling system (±5º), by which the workpiece is fixed horizontally in the direction of the table travel. (Only for model with an X-axis size of 200mm[8"] or larger)



Quick release system* & high-accuracy digital scales

•*Patent pending (Japan)*



High-accuracy glass scale

The MF-A/MF-UA measuring microscopes employs a quick release system in the stage. This allows the operator to switch between a coarse movement and a fine movement instantaneously, and the stage is completely freed by only slightly turning the focus handle in the clockwise direction. This function is especially useful when the distance of the measuring position from the reference point is long or when returning to the reference position quickly. The Zero-switch, which is built into the focus handle, allows operations with both hands remaining on the handle except when focusing. The digital scales, which are built inside the microscope's main body, are of highaccuracy specifications developed in Mitutoyo's underground laboratory equipped with a digital scale accuracy evaluation technology.*

** Mitutoyo's became the first certified calibration agency in Japan for calibrations of line standard (for standard scales with a length of up to 500mm).*

Measuring Microscopes MF-A5

Features

- Bright field observation, clear and flare less erect image, wide field of view.
- Long working distance objectives, up to 100x magnification (total: 2000x).
- Aperture diaphragms in the transmitted illuminaion and reflected illumination system as standard feature.
- The quick-release system, which is especially useful in long-stroke measurements.
- Focus and measure using the fine/coarse movement handle with the large-size grips on both sides of the column.
- Built in X- and Y-axis Zero-set switches (Z-axis has a non-built-in Zero set switch)
- Available with the Vision Unit for upgrading to a vision measuring system.

Tube

MF-A505H
Binocular tube and eyepieces are optional.

MF-A1010H
Binocular tube and eyepieces are optional.

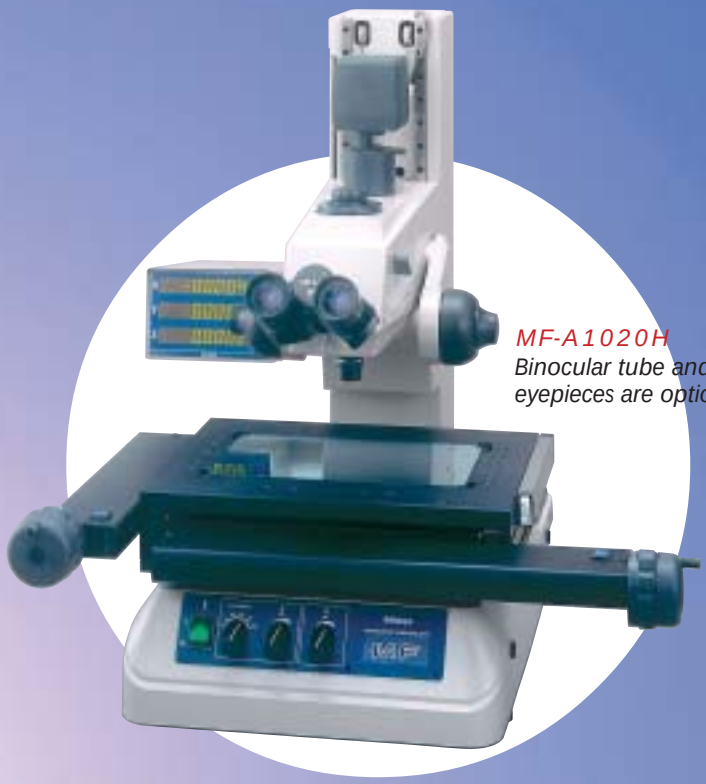
Model Number/Order Number Selection

XY travel range / Observation method & Digital counter	50x50mm (2"x2") □	100x100mm (4"x4") □	200x100mm (8"x4") □	200x170mm (8"x7") □	300x170mm (12"x7") □
Bright field observation type w/ XY counter (mm) w/ XY counter (inch/mm)	MF-A505 176-521□ 176-531□	MF-A1010 176-522□ 176-532□	MF-A1020 176-529□ 176-539□	MF-A1720 176-523□ 176-533□	MF-A1730 176-524□ 176-534□
Bright field observation type w/ XYZ counter (mm) w/ XYZ counter (inch/mm)	MF-A505H 176-525□ 176-535□	MF-A1010H 176-526□ 176-536□	MF-A1020H 176-530□ 176-540□	MF-A1720H 176-527□ 176-537□	MF-A1730H 176-528□ 176-538□

□ Suffix: **A** for 100V, **C** for 110V, **D** for 220V, **E** for 240V or non for 100V

00/1000

Selection



MF-A1020H
Binocular tube and eyepieces are optional.

MF-A1720H
Binocular tube and eyepieces are optional.

MF-A1730H
Binocular tube and eyepieces are optional.

Measuring Microscopes MF-UA

Features

- Bright field observation, clear and flare less erect image, wide field of view.
- Long working distance objectives, up to 200x magnification (total: 4000x).
- Infinity-correction optical system same as that of high power inspection microscopes (FS series).
- Bright/Dark-field observations, Polarized observation and Differential Interference Contrast (DIC) observation.
- The quick-release system, which is especially useful in long-stroke measurements.
- Focus and measure using the fine/coarse movement handle with the large-size grips on both sides of the column.
- Built in X- and Y-axis Zero-set switches (Z-axis has a non-built-in Zero set switch)
- Inward type revolver with 4 lens mount.
- Improved eye level lens for fatigue free use.
- Available with the Vision Unit for upgrading to a vision measuring system.

Bright field observation:
A general inspection method in which a transmitted light is emitted parallel to the optical axis to observe the reflected light. A fiber-optic circular illumination or a twin fiber-optic illumination is used as an auxiliary.

Objectives for bright field observation

Objectives for bright field/dark field observation

DIC units

MF-UA1010THD
Revolver and objectives are optional.

Model Number/Order Number Selection

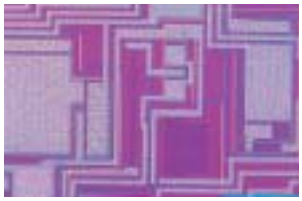
XY travel range / Observation method & Digital counter	50x50mm (2"x2") □	100x100mm (4"x4") □	200x100mm (8"x4") □	200x170mm (8"x7") □	300x170mm (12"x7") □
Bright field observation type w/ XYZ counter (mm) w/ XYZ counter (inch/mm)	MF-UA505TH 176-541□ 176-551□	MF-UA1010TH 176-542□ 176-552□	MF-UA1020TH 176-549□ 176-559□	MF-UA1720TH 176-543□ 176-553□	MF-UA1730TH 176-544□ 176-554□
Bright/Dark field observation type w/ XYZ counter (mm) w/ XYZ counter (inch/mm)	MF-UA505THD 176-545□ 176-555□	MF-UA1010THD 176-546□ 176-556□	MF-UA1020THD 176-550□ 176-560□	MF-UA1720THD 176-547□ 176-557□	MF-UA1730THD 176-548□ 176-558□

□ Suffix: **A** for 100V, **C** for 110V, **D** for 220V, **E** for 240V or non for 100V

A500/1000

Polarized light observation:
A filter (of a polarization unit or an analyzer) placed in the midway of the optical system of the illumination system allows observation of the colors and contrast of a workpiece in accordance with its polarized characteristics.

Dark field observation:
A ring light is emitted obliquely taking the light path surrounding the lens. This method allows a clear image of surface defects and fine steps.



Differential interference contrast observation:
By a combined use of a polarization filter and Differential Interference Contrast prisms, the fine step of a workpiece can be observed in a contrast of colors. Allows bright and clear color distribution with little eye fatigue.

MF-UA1020THD
Revolver and objectives are optional.

MF-UA1720TH
Revolver and objectives are optional.

TECHNICAL DATA

MF-A models

Model No.		MF-A505/H	MF-A1010/H	MF-A1020/H	MF-A1720/H	MF-A17030/H
Optical tube		Choice between Monocular and Binocular tube (depression angle: 25°), Reticle projection method, with TV mount, Optical path ratio (eyepiece/CCD camera: 50/50 fixed)				
Image		Erect image				
Eyepiece lens (Optional)		10x (field No.: 24), 15x (field No.: 16), 20x (field No.: 12)				
Objective		1x, 3x*, 5x, 10x, 20x, 50x, 100x, *Standard accessory				
Focusing	Max. workpiece height	150mm (6")			220mm (9")	
	Method	Manual focusing (coarse focusing: 30mm/rev., fine focusing: 0.2mm/rev.)				
Illumination	Reflected illumination	Telecentric illumination with adjustable aperture diaphragm, 12V/50W halogen lamp (non-stepped brightness adjustment)				
	Transmitted illumination	Koehler illumination with adjustable aperture diaphragm, 12V/50W halogen lamp (non-stepped brightness adjustment)				
Microstage	XY travel range	50x50mm (2"x2")	100x100mm (4"x4")	200x100mm (8"x4")	200x170mm (8"x7")	300x170mm (12"x7")
	Table top dimensions	280x280mm (11.02"x11.02")	280x280mm (11.02"x11.02")	350x280mm (13.78"x11.02")	410x342mm (16.14"x13.46")	510x342mm (20.07"x13.46")
	Effective glass size	170x170mm (6.69x6.69")	170x170mm (6.69x6.69")	240x140mm (9.45x5.51")	260x230mm (10.23"x9.05")	360x230mm (14.17x9.05")
	Swiveling	——	——	——	±5° (left)	±5° (left)
	Max. workpiece weight	5kg (11 lbs.)	5kg (11 lbs.)	10kg (22 lbs.)	20kg (44 lbs.)	20kg (44 lbs.)
	Quick release mechanism	X and Y axes				
	Zero switch	X and Y axes (Z axis : MF-A505H/MF-A1010H/MF-A1020H/MF-A1720H/MF-A1730H)				
Length standard		Linear encoder (Linear Scale) •Patent registered (Japan)				
Digital Counter	Resolution	0.001mm/0.0005mm/0.0001mm (.0001"/.00005"/.00001) switchable				
	No. of axis	2-axis (3-axis: MF-A505H/MF-A1010H/MF-A1020H/MF-A1720H/MF-A1730H)				
	Functions	Zero-setting, Resolution switching, Counting direction switching, Data output via RS-232C				
Measuring accuracy** (at 20°C)		(3+0.02L)µm conforming to JIS B 7153, L = Measuring length (mm)				
Power supply		100/110/120/220/230/240VAC, 50/60Hz, 160W				
Mass		Approx. 55kg (121 lbs.)	Approx. 55kg (121 lbs.)	Approx. 59kg (129 lbs.)	Approx. 130kg (286 lbs.)	Approx. 138kg (303 lbs.)

**Not including the Z-axis measuring accuracy.

Standard accessories

- Microstage
- XY/XYZ digital counter
- Transmitted illuminator
- Reflected illuminator
- Halogen bulb (12V50W, 3 pcs.)
- Machine cover
- Power cord
- 10x/24 eyepiece lens
- 3x objective
- Green filter
- Cross-hair reticle
- Reticle mount

Consumable parts

- 513667: Halogen bulb (12V50W)

MF-UA models

Model No.		MF-UA505TH/THD	MF-UA1010TH/THD	MF-UA1020TH/THD	MF-UA1720TH/THD	MF-UA1730TH/THD
Optical tube •Patent pending (Japan)		Siedentoph type, Pupil distance adjustment (51 to 76mm), 1X tube lens, Binocular eyepiece (depression angle: 20°), Reticle projection method, with TV mount, Optical pass ratio (eyepiece/CCD camera: 50/50 fixed)				
Image		Erect image				
Eyepiece lens		10x* (field No.: 24), 15x (field No.: 16), 20x (field No.: 12), *Standard accessory				
Applicable objective (optional)		for TH type: M Plan Apo, M Plan Apo SL, G Plan Apo for THD type: BD Plan Apo, BD Plan Apo SL				
Applicable revolver (optional) •Patent pending (Japan)		for TH type: Standard BF revolver 378-018, Power BF revolver 378-016 for THD type: Standard BF/DF revolver 176-211, Power BF/DF revolver 176-210				
Focusing	Max. workpiece height	150mm (6")			220mm (9")	
	Method	Manual focusing (coarse focusing: 10mm/rev., fine focusing: 0,25mm/rev.)				
Illumination	Reflected illumination	Telecentric illumination with adjustable aperture diaphragm, 12V/50W halogen lamp (non-stepped brightness adjustment)				
	Transmitted illumination	Koehler illumination with adjustable aperture diaphragm, 12V/100W halogen lamp (non-stepped brightness adjustment)				
Workstage	XY travel range	50x50mm (2"x2")	100x100mm (4"x4")	200x100mm (8"x4")	200x170mm (8"x7")	300x170mm (12"x7")
	Table top dimensions	280x280mm (11.02"x11.02")	280x280mm (11.02"x11.02")	350x280mm (13.78"x11.02")	410x342mm (16.14"x13.46")	510x342mm (20.07"x13.46")
	Effective glass size	170x170mm (6.69x6.69")	170x170mm (6.69x6.69")	240x140mm (9.45"x5.51")	260x230mm (10.23"x9.05")	360x230mm (14.17x9.05")
	Swiveling	——	——	——	±5° (left)	±5° (left)
	Max. workpiece weight	5kg (11 lbs.)	5kg (11 lbs.)	10kg (22 lbs.)	20kg (44 lbs.)	20kg (44 lbs.)
	Quick release mechanism	X and Y axes				
	Zero switch	X, Y and Z axes				
Length standard		Linear encoder (Linear Scale) •Patent registered (Japan)				
Digital Counter	Resolution	0.001mm/0.0005mm/0.0001 (.0001"/.00005"/.00001") switchable				
	No. of axis	3-axis				
	Functions	Zero-setting, Resolution switching, Counting direction switching, Data output via RS-232C				
Measuring accuracy** (at 20°C)		(3+0.02L) µm conforming to JIS B 7153, L = Measuring length (mm)				
Power supply		100/110/120/220/230/240VAC, 50/60Hz, 160W				
Mass		Approx. 55kg (121 lbs.)	Approx. 55kg (121 lbs.)	Approx. 59kg (129 lbs.)	Approx. 130kg (286 lbs.)	Approx. 138kg (303 lbs.)

**Not including the Z-axis measuring accuracy.

Standard accessories

- Binocular eyepiece
- Microstage
- XYZ digital counter
- Transmitted illuminator
- Reflected illuminator
- Halogen bulb (12V50W, 12V100W 2pcs.)
- Machine cover
- Power cord
- 10x/24 eyepiece lens
- Green filter
- Cross-hair reticle
- Reticle mount

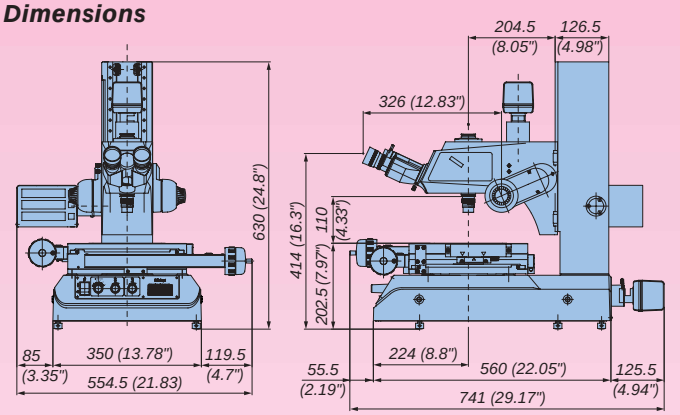
Consumable parts

- 513667: Halogen bulb (12V50W)
- 517181: Halogen bulb (12V100W)*
- 12BAD602 : Halogen bulb (12V100W)*º

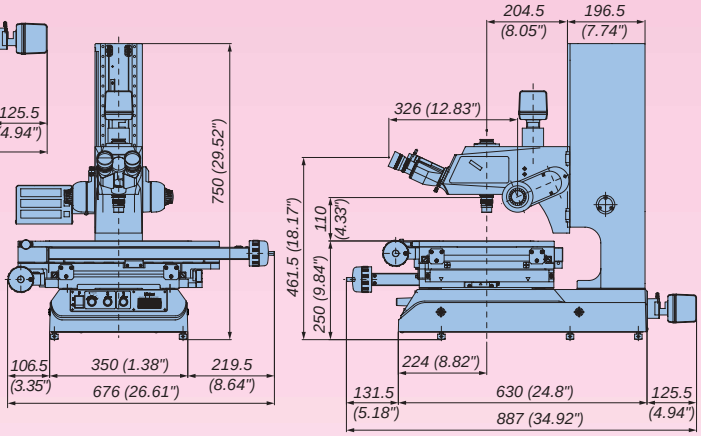
*for reflected illumination º high-Intensity type

Dimensions

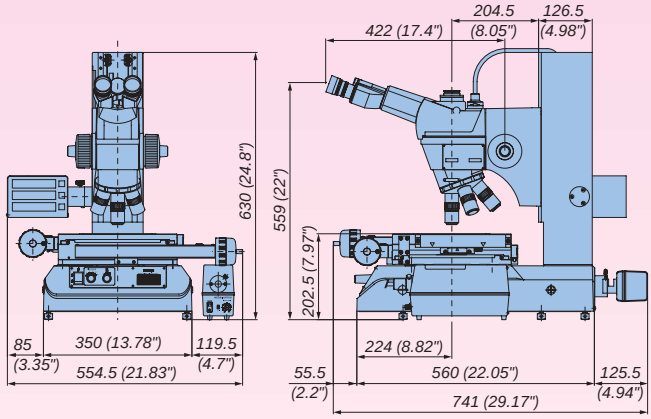
Unit: mm (inch)



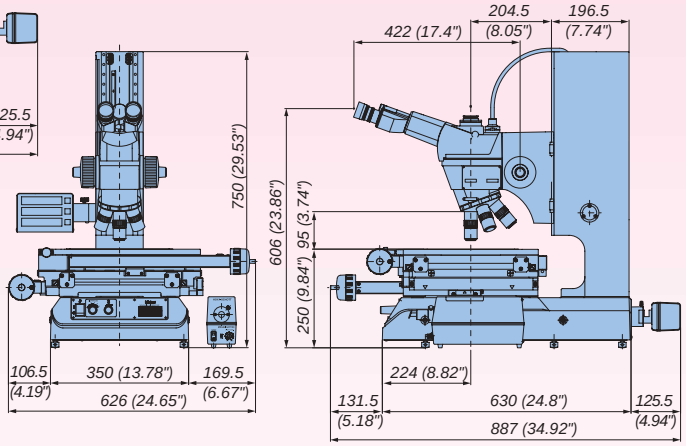
MF-A505H
(with binocular tube)



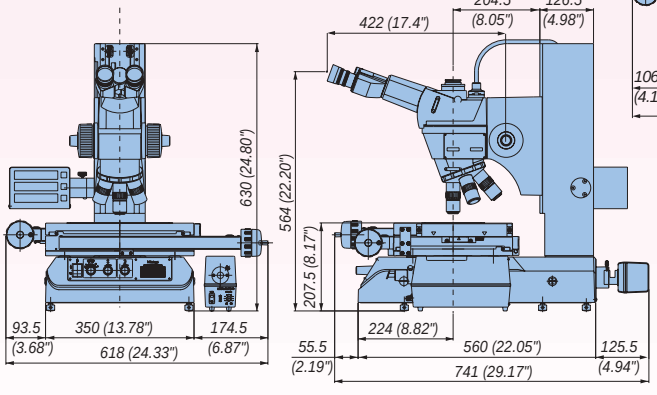
MF-A1730H
(with binocular tube)



MF-UA1010TH
(with standard revolver)

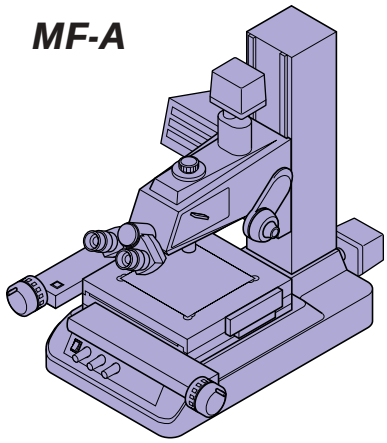


MF-UA1720TH
(with standard revolver)



MF-UA1020TH
(with standard revolver)

SYSTEM DIAGRAM



- Monocular tube* No. 176-302
- Binocular tube* No. 176-303
  - *with 10X eyepiece
- Eyepiece 10x No. 378-856
- Eyepiece 15x No. 378-857
- Eyepiece 20x No. 378-858
- Protractor eyepiece 10x No. 375-043
- Digital protractor eyepiece 10x No. 375-040□
- Double image eyepiece 10x No. 375-044
- Rotary template eyepiece No. 176-357
- Reticles
- Objective 1X No. 375-036
- Objective 3X No. 375-037
- Objective 5X No. 375-034
- Objective 10X No. 375-035
- Objective 20X No. 375-051
- Objective 50X No. 375-052
- Objective 100X No. 375-053
- Vibration damping stand No. 176-308
- Mounting table No. 176-309
- Lens cleaning kit No. 12AAA165
- Stage micrometer No. 375-056
- C-mount adapter No. 970441
- 0.5x camera adapter No. 375-054
- Focus pilot No. 375-055□
- Vision unit No. 359-670
- Connecting cable set No. 12AAA807
- QM-Data200 No. 264-140□
- Foot switch No. 937179T
- Oblique surface illumination unit No. 176-351-5
- Bifurcated fiber illuminator No. 176-343□
- Fiber-optic ring light illuminator No. 176-366□
  - GIF filter No. 12BAA583
  - LB80 filter No. 12BAA584
  - ND2 filter No. 12AAB251
  - ND8 filter No. 12AAB252
- LED circular illuminator No. 176-367□(White)
- LED circular illuminator No. 176-368□(Green)
- 505/1010 models
  - Rotaly table with fine feed knob No. 176-305
    - Holder with clamp No. 176-107
    - V-block with clamp No. 172-378
    - Swivel center support No. 172-197
- 1020 models
  - T-groove mount adapter No. 176-310
    - Holder with clamp No. 176-107
    - V-block with clamp No. 172-378
    - Swivel center support No. 172-197
- 1720/1730 models
  - T-groove mount adapter No. 176-304
    - Holder with clamp No. 176-107
    - V-block with clamp No. 172-378
    - Swivel center support No. 172-197
  - Rotaly table with fine feed knob No. 176-306
- Halogen bulb 12V50W No. 513667
- Halogen bulb (long-life type) 12V50W No. 12BAB345
- GIF filter No. 12AAA645
- LB80 filter No. 12AAA646
- ND2 filter No. 12AAA643
- ND8 filter No. 12AAA644

MF-A Standard accessories

□Suffix: **A** for 100V, **C** for 110V, **D** for 220V, **E** for 240V or non for 100V

Focus pilot
No. 375-065□

0.5x camera adapter
No. 375-054

Eyepiece 10x
No. 378-856

Eyepiece 15x
No. 378-857

Eyepeice 20x
No 378-858

Adapter unit
No. 378-042

Vision unit
No. 359-675

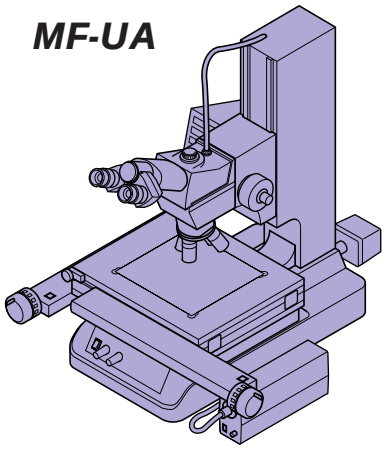
Connecting cable set
No. 12AAA807

QM-Data200
No. 264-140□

Foot switch
No. 937179T

DIC unit
No. 378-080
for 5x, 10x
No. 378-079 for 20x
No. 378-078
for 50X, SL20x
No. 378-076
for 100x, SL50x, SL80x

MF-UA



Bifurcated fiber illuminator
No. 176-343□

GIF filter
No. 12BAA583*

LB80 filter
No. 12BAA584*

ND2 filter
No. 12AAB251*

ND8 filter
No. 12AAB252*

*Can be mounted on the light source of reflected illuminator attached main body.

Polarzation unit
(BF/BD)
No. 378-092

Vibration damping stand
No. 176-308

Mounting table
No. 176-309

Lens cleaning kit
No. 12AAA165

Stage micrometer
No. 375-056

505/1010 models

1020 models

1720/1730 models

Rotaly table with fine feed knob
No. 176-305

T-groove mount adapter
No. 176-310

T-groove mount adapter
No. 176-304

Rotaly table with fine feed knob
No. 176-306

Holder with clamp
No. 176-107

V-block with clamp
No. 172-378

Swivel center support
No. 172-197

Holder with clamp
No. 176-107

V-block with clamp
No. 172-378

Swivel center support
No. 172-197

Holder with clamp
No. 176-107

V-block with clamp
No. 172-378

Swivel center support
No. 172-197

Adjustable power revolver(BF)
No. 378-016

Adjustable revolver(BF)
No. 378-018

Power revolver(BF/DF)
No. 176-210

Revolver(BF/DF)
No. 176-211

Objective
M Plan Apo series

Objective
M Plan Apo SL series

Objective
G Plan Apo series

Objective
BD Plan Apo series

Objective
BD Plan Apo SL series

Halogen bulb
(long-lifetype) 12V50W
No. 12BAB345

Halogen bulb
12V50W No. 513667
12V100W No. 517181
12V100W (high-intensity)
No. 12BAD602

GIF filter
No. 12AAA645

LB80 filter
No. 12AAA646

ND2 filter
No. 12AAA643

ND8 filter
No. 12AAA644

MF-UA Standard accessories

□Suffix: **A** for 100V, **C** for 110V, **D** for 220V, **E** for 240V or non for 100V

OPTIONAL ACCESSORIES

Vision Unit - Retrofit vision system

Features

- Upgrade your measuring microscope to a vision measuring system by adapting the Mitutoyo Vision Unit to the microscope camera mount.
- Clear and sharp images with the color CCD camera.
- Increased performance-cost ratio.
- Wide field of view due to the 0.5X camera adapter.
- Programmable illumination control.

QSPak

•Patent registered (Japan)
•Patent pending (Japan)

A unique vision measuring software that provides powerful capabilities and comprehensive measurement analysis

For observation/comparison of a form

- Template matching function
- Manual pattern matching function

For simple measurement

- One-click edge detection tool function
- Smart tool function
- User macro function

For repeated measurement/ auto-measurement

- Quick navigation function
- Playback function
- Graphic function
- External data output function
- Statistical calculation function

Vision Unit

Add-on illumination switches

The QSPak can control the intensity of transmitted and reflected illuminations. In the repeat mode, the QSPak automatically recalls and sets the intensity of respective illuminations according to settings created in the learn mode. This means repeat measuring for batches of the same part with very high repeatability and stable edge detection.*

**The optional fiber-optic ring light illuminator is available for the MF-A models*

The PC system and microscope are optional.

Vision Unit Order No.: 359-670 (MF-A) / 359-675 (MF-UA)

Specifications

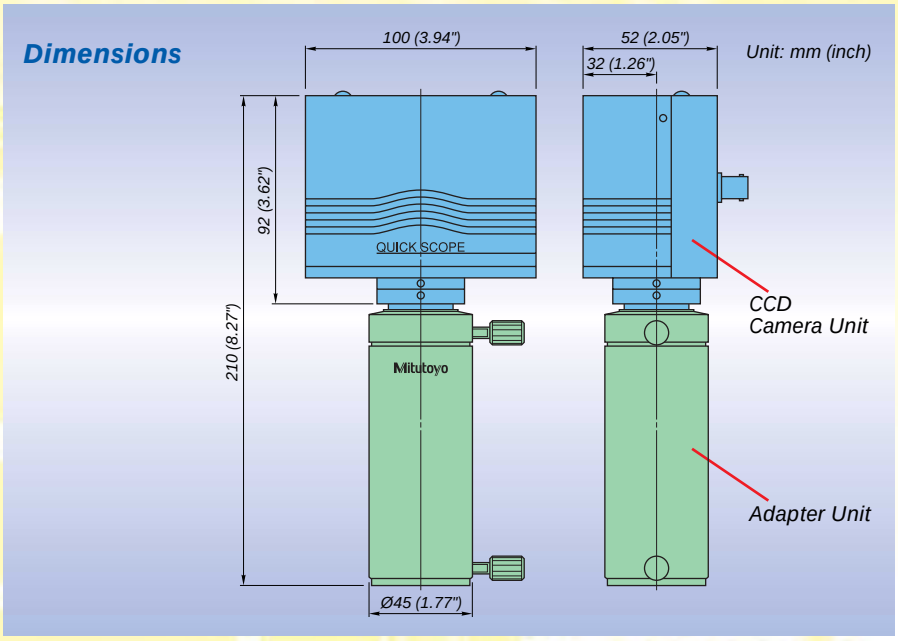
CCD camera unit	• Image sensor: 1/3" color CCD camera • Resolution: 0.0001mm • Dimensions (WxDxH): 100x58x92mm • Mass: 0.4kg
Adapter unit	• Operating software: QSPak • Dimensions: 45x123mm • Magnification: 0.5X • Mass: 0.3kg
Magnifications on 17" monitor	• 21X, 63X, 105X, 210X (21X when using 1X objective, 63X when using 3X objective, 105X when using 5X objective, 210X when using 10X objective)
Standard accessory	• Foot switch (**937179T**)

Note: Table swiveling or rotation of the microscope is not allowed during vision measurement.

PC Operation Environment

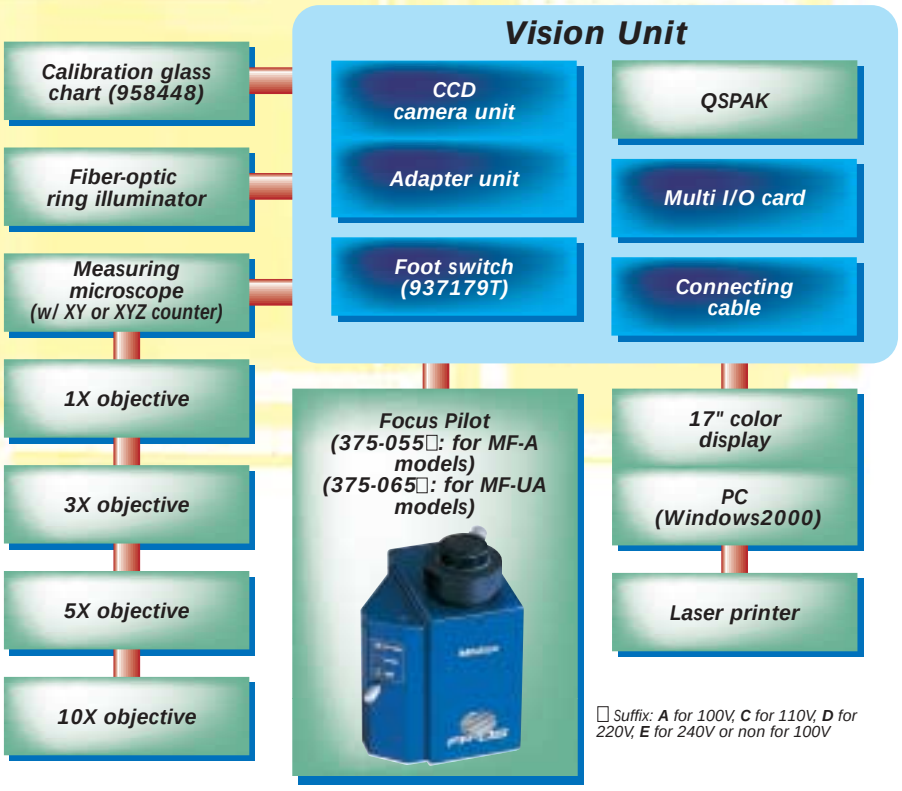
PC type	• IBM PC-Compatible
CPU	• Processor: Intel Pentium 4 • Memory: 256MB or more • Hard disk: 10GB or more • Floppy disk drive: 3.5", 1.44MB • CD-ROM drive: 12x or faster • OS: Windows 2000 SP2
Monitor	• Screen size: 17" • Display: SVGA-color (1024x768 dots)
Peripherals	• Keyboard • Mouse

Dimensions



System Diagram

: Optional accessory



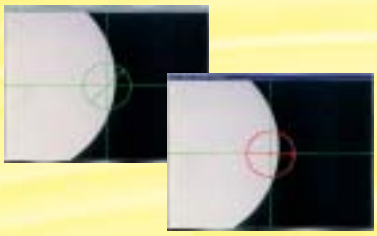
□ Suffix: **A** for 100V, **C** for 110V, **D** for 220V, **E** for 240V or non for 100V

Macro functions

The function window allows easy selection of macro icons for 48 different measurements. Macros are shown on three different pages, easily accessed by tabs located along the bottom edge of the window. Using the macro function, QS Pak automatically selects the appropriate measuring tool to detect workpiece edge and calculate the appropriate feature: diameter, radius, etc.

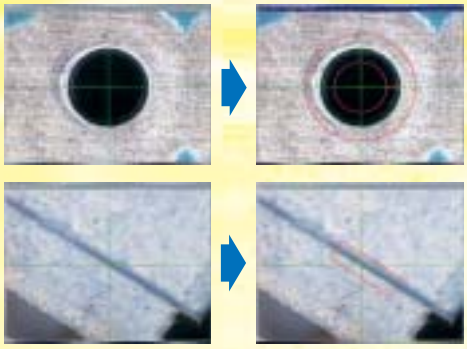
Smart tool

By moving an image into the central measuring circle, QSPak automatically scans and detects the most clear edge and centers it in the circle. It's faster and more accurate than using a profile projector or microscope with cross-hairs.



One click edge detection

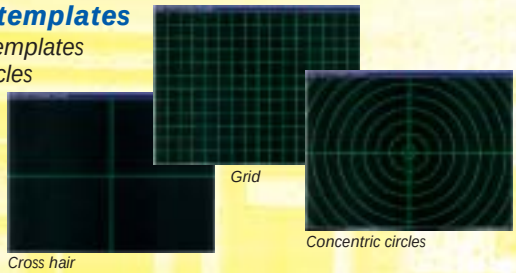
Just by clicking the mouse near the edge of a workpiece, QSPak automatically scans the edge and detects it, showing its coordinates. This function also works with the point tool, box tool, circle tool and auto-focus tool.



Template tools

•Standard templates

The standard templates function as reticles of microscope.

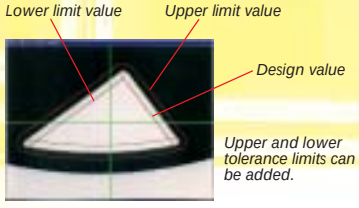


•Extended templates

Four other templates are available as extended template: cross, circle, square and angle. The size of a diameter, a distance, an angle, etc. can be changed just by entering a desired value with the keyboard. It allows simple comparison measurements, only much faster and more accurately than with a profile projector.

•Manual pattern matching

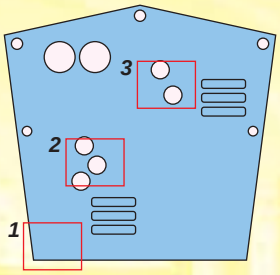
Different templates can be generated from the master workpiece which are not included in the standard and extended template sections. Upper and lower tolerance levels can be added onto the master workpiece template by entering the tolerance values via the keyboard. This allows the user to customize templates for individual workpieces.

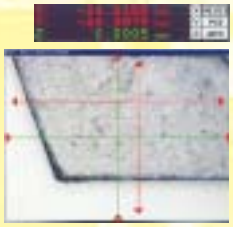


Input the edges by using the manual tool. Join the input points to complete the template.

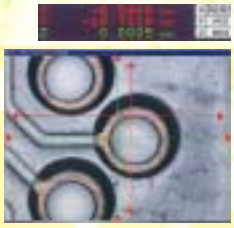
Repeat measurement navigation

The QSPak can repeat measurement routines set/stored in the Learn mode. In the Repeat mode the XY distance from the current position to the next target point is displayed on the counter. And the XY table travel direction to be done is indicated by the red cross-hairs. When moving to the next measurement point, all the operator has to do is move the XY table until either the counter reads zero or by laying the green cross-hairs on top of the red cross-hairs.





1. *Start repeat-mode. The red cross-hairs indicates the direction of the next measurement point.*



2. *Move the XY table as the red cross-hairs approach the green cross-hairs.*

3. *When the green cross-hairs overlaps the red cross-hairs, the measurement tool(s) will appear on the screen. Click the DATA button to measure the point.*

Security function

This function limits access to the QSPak operation by requiring a password for access. This prevents unauthorized users from changing part programs, measuring conditions, etc.

Abnormal Data Eliminating Function

This function eliminates any point data that is not consistent with the majority of measured data, thereby ensuring measurement accuracy for workpieces with burrs, nicks and other flaws.

Icon editor function

The layout for the macro icons in the function window and the tool icons in the tool window can be easily changed by the user for increased efficiency.

Smart editor function

A series of operation procedures such as moving the XY table, changing magnifications, etc., can be displayed as a flow chart for quick reference or teaching new operators measuring routines. This function also allows part programs to be edited by using the edit screen.

Graphic window

The measurement results and measured elements are plotted in the graphic window in real-time. By using this function the operator can check the current measuring position at a glance. The graphic window can be used for geometrical calculation between features to speed up measurement.

Image capture

A color CCD camera is used to provide for realistic workpiece observation and measurement. The color image can be captured and stored as a bitmap image for other uses and can be printed out.

Output of measurement results & MeasureReport/E

*The measurement results obtained in the Repeat mode can be output via the CSV format which is compatible with application software such as Microsoft Excel. The MeasureReport/E (Order No.: **02ARA142**) is a Microsoft Excel® Ver 5.0 based inspection report creation software, capable of formatting the measured data from Vision Unit/QSPak into an inspection report that can be automatically printed out. Statistical calculation, GO/NG judgment and printing out can be dealt with macro commands. Thus, the time and cost involved in creating an inspection report can be reduced dramatically over the conventional way.*

***Note:** MeasureReport/E does not include Microsoft Excel® Ver5.0. It needs to be provided by the user.*
**Microsoft Excel is a registered trademark of Microsoft Corporation.*

OPTIONAL ACCESSORIES

Simplified Key Operation

2D Data Processing Unit

QM-Data200

Mitutoyo launches a new 2D data processing unit for optical instruments. The QM-Data200 can add new features of 2D coordinate measurement, image processing, etc. into your ordinary optical instruments to improve the QC control system.

Simple & Powerful!
Upgrading optical instruments!

Technical Data

Display		*Graphic LCD (320x240) with backlight*
I/O	*X, Y, Z*	*Scale signal input for Linear Scale (max. 3-axis)*
	RS-232C 1	*Data output for external PC*
	RS-232C 2	*Data input for optical instrument (counter)*
	OPTOEYE	*Edge signal input for Optoeye E2 (option)*
	FS	*For foot switch (option)*
	PRINTER	*For external printer (option)*
	FD	*For floppy disk drive (option)*
Data output	*RS-232C*	*Measurement result for PC*
Counter	*No. of axis*	*X, Y and Z-axis (max. 3-axis)*
	Resolution	*0.1µm (when connecting with 10µm/10µm scale)*
Adjustable display angel		*+80° to -50° (adjustable stand model only)*
Operating temperature		*10° to 30°*
Power supply/consumption		*100V AC to 240V AC, 50/60Hz, 24W*
Dimensions (WxDxH)		*200x90x280mm (7.87"x3.54"x11.02")*
Mass		*Approx. 2.1kg (4.62 lbs.)*

QM-Data200
Order No.: 264-140■

adjustable stand model

*To denote your AC line receptacle/cable add the following suffixes (e.g. **264-140A**). **A** for UL/CSA type, **C** for JAPAN type, **D** for CEE type, **E** for BS type*

Optional accessories

937179T:	*Foot switch*
12AAA807:	*Connecting cable (2m/40")*

Features

• For optical instruments

The QM-Data200 is a geometric readouts/analysis unit for optical instruments like a profile projectors. This features powerful 2D coordinate measurement capabilities with unmatched simple key operation. The QM-Data200 improves operator productivity, minimizes errors and save a total measurement time and production cost.

• Graphic display

Measurement information and data are visualized on the back-lit LCD display with graphical interfaces. The geometric feature that you selected is displayed with the probing navigator. The measurements map and blink indication show you the probing points and sequences. Simply probe points and click by following the blink indicator the measurement can be easily completed even a beginner. This improves operation accuracy and reduces errors and time.

• Intuitive panel design

With rich experiences in the precision measurement with optical instruments, Mitutoyo employs the "Geometry Keys" to accelerate the measurement process. The probing routine of standard geometric features and combinations are designed with Geometry Keys on the front panel. Click of a key that you need and capture features you can complete the measurement quickly and accurately. This improves operator productivity, reduce errors and save operation time and cost. To easily integrate into the existing workflow, the QM-Data200 provides an another way of measurement style. Capture the individual geometry features, then manage the data for geometry combination.

Software

Standard geometric element	Point, Line, Circle, Distance, Ellipse, Rectangular hole, oval hole, Intersection/angle
Geometry combination pattern	Pitch, Line-to-point distance, Line- to-circle distance, Circle- to-circle distance, Line- to-circle intersection, Circle- to-circle intersection, Point-to-point midpoint, Line- to-point midpoint, Line- to-line midline, Perpendicularity, Parallelism, Point-to-circle distance, Circle-to-circle midpoint, Point-to-circle tangent line, Circle-to-circle tangent line, Corner circle, Height
AI function (available geometry)	Point, Line, Circle, Distance, Ellipse, Rectangular hole, oval hole, Intersection/angle
Input style	Point, Line, Circle, Distance, Ellipse, Rectangular hole, oval hole, Intersection/angle
Combination calculation	Intersection (line-to-line, line-to-circle, circle-to-circle), Midpoint (point-to-point, point-to-line), Contact point, Projected point, Midline (line-to-line, line-to-point), Tangent line, Perpendicular, Contact circle, Distance (point-to-point, line-to-point, circle-to-point, line-to-circle, circle-to-circle), Intersection/angle, Supplementary angle, Three-point intersection angle, Perpendicularity, Parallelism
Element recall	Point, Line, Circle, Distance, Ellipse, Rectangular hole, oval hole, Intersection/angle
Element key-in	Point, Line, Circle
Memory	1000 elements (max.)
Coordinate system setup	4 patters (setup), 4 patters (alignment), Memory/recall/reset
Geometry tolerancing	OK/+NG/-NG judgment, Error amount output
Part program	Learn, Repeat, Edit (insert, delete, add)
Statistical processing item	Number of data, Max. value, Min. value, Average, Standard deviation, Histogram

OPTIONAL ACCESSORIES

Focus Pilot - focus assisting unit

•Patent pending (Japan, U.S.A.)

- By installing this unit on the camera mount of an MF-A/MF-UA type microscope and projecting the focusing chart on the workpiece surface, the focal point can be detected with high-accuracy and high-repeatability.
- Two types of chart patterns are available. Select the pattern in accordance with the type of the workpiece surface texture.
- The brightness of the chart can be adjusted.
- A wide view field observation on the monitor is made possible with the use of a CCD camera (C-mount adapter is included.)

Focusing charts

Concentric circle

Slit

Specifications

Order No.	375-055□	375-065□*
Applicable microscope	MF-A model	MF-UA model
Focusing repeatability	Approx. 1.5µm (reference data using 20x objective)	
Magnification	0.5X	
Magnification accuracy	±0.1% (within 2/3 area from the center of view field)	
Camera adapter	C-mount with centering/perfocal adjustment (provided)	
Applicable CCD camera	Up to 2/3-inch	
Power supply	100/110/120/220/230/240VAC, 50/60Hz, 180W	
Mass	1.8kg (3.96 lbs.)	

*Factory-set-option

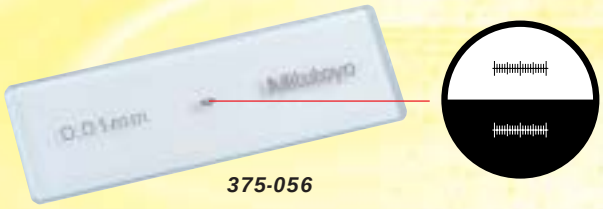
□ Suffix: **A** for 100V, **C** for 110V, **D** for 220V, **E** for 240V or non for 100V

Polaroid photographic unit

- Allows instant photographs of the image obtained from the microscope.
- Photograph magnification: 10X

02AKA250

Stage micrometer

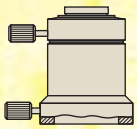


375-056

Order No.	375-056
Range	1mm
Graduations	0.01mm
Accuracy (at 20°C)	(1+L)µm, L = Measuring length (mm)
Dimensions (WxD)	76x26xmm
Mass	16g

C-mount adapter

- Used to mount a CCD video camera with a C-mount on the microscope.
- Video monitoring of the image obtained from the microscope allows multiple operators to observe the image. Since images on a video monitor cause less eye-fatigue, they can be observed for long periods.



378-042:
for MF-UA type

970441:
for MF-A type

0.5x camera adapter

- Observations on the video monitor over a wide visual field can be made with the 0.5X wide-angle lens.
- Magnification accuracy: ±0.1%
- With C-mount

375-054

Eyepieces - individual

378-856-5 378-857-5 378-858-5

Order No.	378-856-5*	378-857-5	378-858-5
Magnification	10X	15X	20X
Field number	24	16	12
Remarks	Diopter adjustable		

*Standard accessory of the monocular type MF-A.

Eyepieces - pair

378-856 378-857 378-858

Order No.	378-856*	378-857	378-858
Magnification	10X	15X	20X
Field number	24	16	12
Remarks	Diopter adjustable		

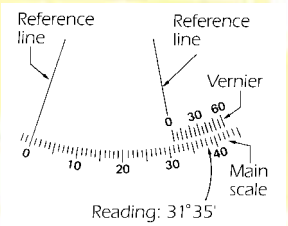
*Standard accessory of the binocular type MF-A.

Special eyepieces - for MF-A models

10x/21 protractor eyepiece

360° angle measurement can be performed by aligning the rotary reticle lines with the workpiece image in the field of view.

375-043



10x/18 digital protractor eyepiece

•Patent pending (Japan)

360° angle measurement can be performed by aligning the cross hair lines on the reticle with the workpiece image in the field of view.

- Range: 0.00° to ±369.99° (0°00' to ±369°59')
- Resolution: 0.01° (1')
- Reticle: 90° and 45° cross hairs

375-040□

□ Suffix: **A** for 100V, **C** for 110V, **D** for 220V, **E** for 240V or non for 100V

Reticle for digital protractor eyepiece

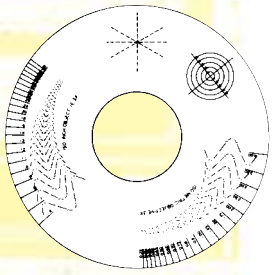
(Standard equipment)

10x/21 rotary template eyepiece (for 3x objective)

Allows efficient measurement of screw threads, using the rotary templet on which ISO metric and ISO unified screw thread patterns, concentric circles, and cross hairs are printed.

- ISO metric screw thread: 0.25, 0.3, 0.35, 0.4, 0.45, 0.5, 0.6, 0.7, 0.75, 0.8, 0.9, 1, 1.25, 1.5, 1.75, 2, 2.5, 3, 3.5, 4
- ISO unified screw thread: 80, 75, 64, 56, 48, 44, 40, 36, 32, 28, 24, 20, 18, 16, 14, 13, 12, 11, 10, 9, 8, 7, 6
- Concentric circles: ø1, ø2, ø3, ø4, ø5
- Cross hairs: 60°, 90°

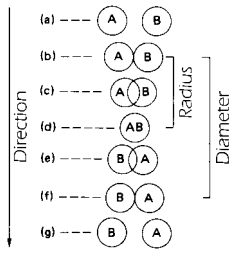
176-357



10x/22 double image eyepiece

Allows efficient measurement of hole-to-hole distances, hole diameters, and line widths, using the double workpiece image that is generated when the workpiece is not aligned with the optical axis of the microscope.

375-044



OPTIONAL ACCESSORIES

Objectives - for MF-A models

- The long working distance provides a wide space between the lens surface and the workpiece surface in focus, making it possible to observe workpieces which are usually hard-to-focus because of their projections like a step.

Order No.	Magnification	N.A.	W.D. (mm)	R (µm)	D.F. (µm)	F.V. (eyepiece, mm)	F.V. (CCD camera, mm)	Mass (g)
375-036	1x	0.03	59.0	9.2	306	ø24	4.8x6.4	110
375-037	3x	0.07	72.5	3.9	56	ø8	1.6x2.1	45
375-034	5x	0.11	59.5	2.5	23	ø4.8	0.96x1.28	80
375-035	10x	0.18	44.0	1.5	8.0	ø2.4	0.48x0.64	100
375-051	20x	0.42	20.0	0.7	1.6	ø1.2	0.24x0.32	310
375-052	50x	0.55	13.0	0.5	0.9	ø0.48	0.10x0.13	350
375-053	100x	0.70	6.0	0.4	0.6	ø0.30	0.06x0.08	380

FS Objectives - for MF-UA models

•Patent registered (Japan)

- The long working distance type FS ULWD Objectives provide a wide space between the lens surface and the workpiece surface in focus, making it possible to observe workpieces which are usually hard-to-focus because of their projections like a step.
- The metallurgical plan apochromatic (M Plan Apo) objective is an excellent optical system. This objective provides a flat, chromatic aberration free image with little color aberration throughout the field of view, making it is suitable for any type of microscope.

M Plan Apo type objectives for bright field observation

M Plan Apo - standard type

Order No.	Magnification	N.A.	W.D. (mm)	F (mm)	R (µm)	D.F. (µm)	F.V. (eyepiece, mm)	F.V. (CCD camera, mm)	Mass (g)
378-800*	1x	0.025	11.0	200	11.0	440	ø24	4.8x6.4	300
378-801	2x	0.055	34.0	100	5.0	91	ø12	2.4x3.2	220
378-802-2	5x	0.14	34.0	40	2.0	14.0	ø4.8	0.96x1.28	230
378-803-2	10x	0.28	33.5	20	1.0	3.5	ø2.4	0.48x0.64	230
378-804-2	20x	0.42	20.0	10	0.7	1.6	ø1.2	0.24x0.32	370
378-805-2	50x	0.55	13.0	4	0.5	0.9	ø0.48	0.10x0.13	290
378-806-2	100x	0.70	6.0	2	0.4	0.6	ø0.24	0.05x0.06	320

*M Plan Apo 1x () should be used together with an appropriate polarizer unit.

M Plan Apo SL - super-long working distance type

Order No.	Magnification	N.A.	W.D. (mm)	F (mm)	R (µm)	D.F. (µm)	F.V. (eyepiece, mm)	F.V. (CCD camera, mm)	Mass (g)
378-810-2	20x	0.28	30.5	10	1.0	3.5	ø1.2	0.24x0.32	240
378-811-2	50x	0.42	20.5	4	0.7	1.6	ø0.48	0.10x0.13	275
378-812-2	80x	0.50	15.0	2.5	0.6	1.1	ø0.30	0.06x0.08	280
378-813	100x	0.55	13.0	2	0.5	0.9	ø0.24	0.05x0.06	290
378-816	200x	0.62	13.0	1	0.4	0.7	ø0.12	0.025x0.03	490

M Plan Apo - high resolving power type (available on order-to-made basis)

Order No.	Magnification	N.A.	W.D. (mm)	F (mm)	R (µm)	D.F. (µm)	F.V. (eyepiece, mm)	F.V. (CCD camera, mm)	Mass (g)
378-814	50x	0.75	5.2	4	0.4	0.48	ø0.48	0.10x0.13	330
378-815	100x	0.90	1.3	2	0.3	0.34	ø0.24	0.05x0.06	410

G Plan Apo - with glass thickness (3.5mm) compensation (available on order-to-made basis)

Order No.	Magnification	N.A.	W.D. (mm)	F (mm)	R (µm)	D.F. (µm)	F.V. (eyepiece, mm)	F.V. (CCD camera, mm)	Mass (g)
378-847	20x	0.28	29.42	10	1.0	3.5	ø1.2	0.24x0.32	270
378-848	50x	0.50	13.89	4	0.6	1.1	ø0.48	0.10x0.13	320

N.A.: Numerical aperture W.D.: Working distance F: Focal length R: Resolving power D.F.: Depth of focus F.V.: Field of view when using ø24 eyepiece or 1/2" CCD camera

FS Objectives - for MF-UA models

•Patent pending (Japan)

BD Plan Apo - standard type

Order No.	Magnification	N.A.	W.D. (mm)	F (mm)	R (µm)	D.F. (µm)	F.V. (eyepiece, mm)	F.V. (CCD camera, mm)	Mass (g)
378-831	2x	0.055	34.0	100	5.0	91	ø12	2.4x3.2	230
378-832	5x	0.14	34.0	40	2.0	14.0	ø4.8	0.96x1.28	240
378-833	10x	0.28	33.5	20	1.0	3.5	ø2.4	0.48x0.64	240
378-834	20x	0.42	20.0	10	0.7	1.6	ø1.2	0.24x0.32	300
378-835	50x	0.55	13.0	4	0.5	0.9	ø0.48	0.10x0.13	320
378-836	100x	0.70	6.0	2	0.4	0.6	ø0.24	0.05x0.06	320

BD Plan Apo SL - super-long working distance type

Order No.	Magnification	N.A.	W.D. (mm)	F (mm)	R (µm)	D.F. (µm)	F.V. (eyepiece, mm)	F.V. (CCD camera, mm)	Mass (g)
378-840	20x	0.28	30.5	10	1.0	3.5	ø1.2	0.24x0.32	240
378-841	50x	0.42	20.5	4	0.7	1.6	ø0.48	0.10x0.13	310
378-842	80x	0.50	15.0	2	0.6	1.1	ø0.30	0.06x0.08	310
378-843	100x	0.55	13.0	2	0.5	0.9	ø0.24	0.05x0.06	320

BD Plan Apo - high resolving power type (available on order-to-made basis)

Order No.	Magnification	N.A.	W.D. (mm)	F (mm)	R (µm)	D.F. (µm)	F.V. (eyepiece, mm)	F.V. (CCD camera, mm)	Mass (g)
378-845	50x	0.75	5.2	4	0.4	0.48	ø0.48	0.10x0.13	370
378-846	100x	0.90	1.3	2	0.3	0.34	ø0.24	0.05x0.06	435

BD Plan Apo type objectives for bright field/dark field observation

DIC units – for FS Objectives

378-080: for 5x and 10x objectives
378-079: for 20x objectives
378-078: for 50x and SL20x objectives
378-076: for 100x, SL80x and SL50x objectives

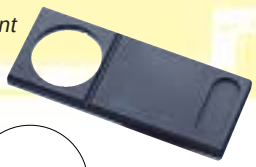
Reticles - for MF-A models only (use with 3x objective)

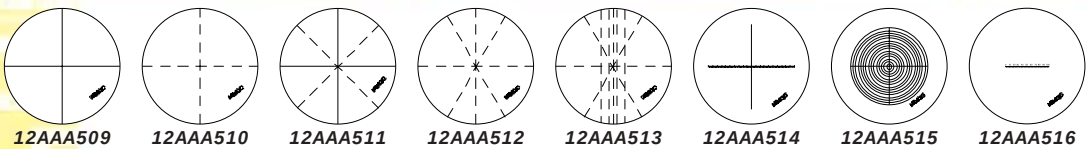
Order No.	Templet patterns
12AAA509	Cross-hair
12AAA510	Broken cross-hair
12AAA511	Cross-hair and 45° angle
12AAA512	Broken cross-hair and 60° angle
12AAA513	Zeiss type chart
12AAA514	20mm scale (0.1mm reading)
12AAA515	Concentric circle (ø1.2-ø18mm)
12AAA516	10mm scale (0.1mm reading)

Order No.	Templet patterns
12AAA517	5mm scale (0.05mm reading)
12AAA518	10x10mm section (1mm min.)
12AAA519	Metric screw thread (P = 0.25-1.0)
12AAA520	Metric screw thread (P = 1.25-2.0)
12AAA521	Involute gear tooth (14.5°), module = 0.1-1.0
12AAA522	Involute gear tooth (20°), module = 0.1-1.0

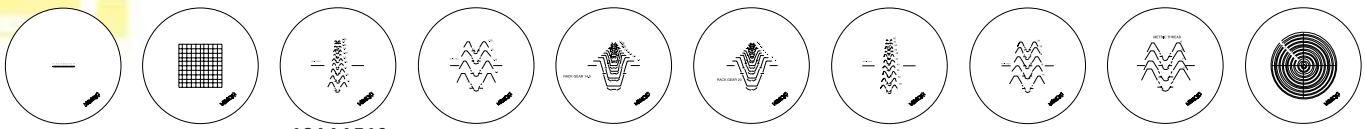
Order No.	Templet patterns
12AAA523	Unified screw thread (80 - 28TPI)
12AAA524	Unified screw thread (24 - 14TPI)
12AAA525	Unified screw thread (13 - 10TPI)
12AAA526	Concentric circle (ø.01"-ø.2")

Reticle mount is provided.





12AAA509 12AAA510 12AAA511 12AAA512 12AAA513 12AAA514 12AAA515 12AAA516



12AAA517 12AAA518 12AAA519 12AAA520 12AAA521 12AAA522 12AAA523 12AAA524 12AAA525 12AAA526

OPTIONAL ACCESSORIES

Illumination Unit - for MF-A models

Fiber-optic Ring Light Illuminator
- for MF-A models

176-366
(installed on measuring micrometer)

- *With the Fiber-optic ring light illuminator, the workpiece is clearly illuminated and the surface is free from distracting shadows. Not available when using 20X, 50X, 100X objectives.*
- *Light source: Halogen bulb (12V, 100W)*
- *Length of fiber cable: 1000mm (40")*
- *Dimensions (WxDxH): 235x76x120mm (9.25"x2.99"x4.72")*
- *Mass: 2kg (4.4 lbs.)*

Order No. 176-366□
*□ Suffix: **A** for 100V, **C** for 110V, **D** for 220V, **E** for 240V or non for 100V*

Bifurcated Fiber Illuminator

176-343
(installed on measuring micrometer)

- *The bifurcated fiber illuminator offers two light sources to illuminate the workpiece at the same time.*
- *Light source: Halogen bulb (12V, 100W)*
- *Length of fiber cable: 1800mm (40") [176-343: 600mm (24")]*
- *Dimensions (WxDxH): 235x76x120mm (9.25"x2.99"x4.72")*
- *Mass: 2.5kg (5.5 lbs.) [176-343: 2kg (4.4 lbs.)]*

Order No. 176-343□ *(w/ 1800mm fiber cable)*
*□ Suffix: **A** for 100V, **C** for 110V, **D** for 220V, **E** for 240V or non for 100V*

Transmitted illumination

The halogen light emits light from the bottom through the stage glass, illuminating the workpiece vertically to the objective lens, thus providing a clear image of the workpiece contour.

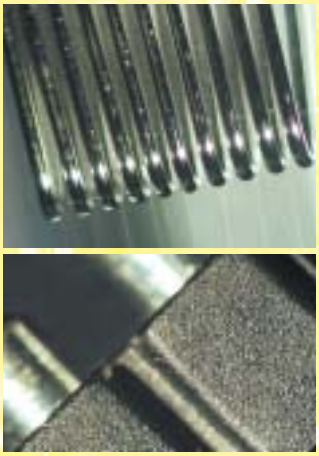
Vertical reflected illumination

The halogen light emits the light that takes a light path within the range of the objective lens, coaxial to the optical axis.

Oblique surface illumination

The halogen light emits light from both sides of the objective lens, allowing an adjustment of the light angle.

Bifurcated fiber illumination



The halogen lights emit light diagonally from two arbitrary directions. These are equipped with the condenser lenses that allow high-luminance spot illumination.

LED Circular Illuminator
- for MF-A models

176-368 *(green)*
(installed on measuring micrometer)

- *Employing bright LED*
- *Non-stepped brightness control*
- *Not available when using 20X, 50X, 100X objectives.*
- *Light source: LED 12V7.7W (both of white and green)*
- *Outside diameter : 70mm (2.76") / Height: 83-98mm (3.3"-3.9")*
- *Mass: 3.5kg (7.7 lbs.)*

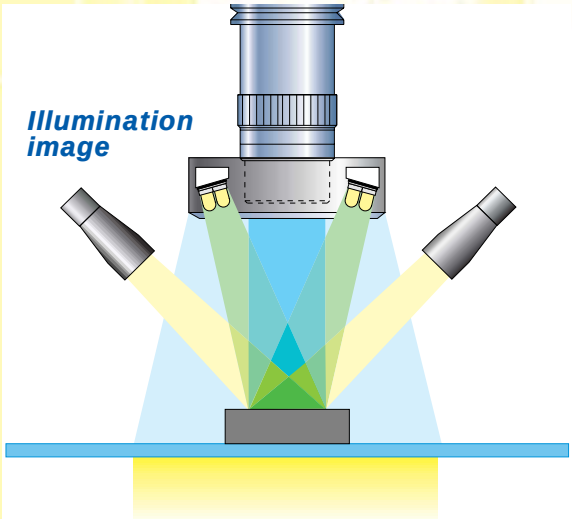
Order No. 176-367□ *(white)*
176-368□ *(green)*

□ *Suffix: **A** for 100V, **C** for 110V, **D** for 220V, **E** for 240V or non for 100V*

Oblique Surface Illumination Unit
- for MF-A models

- *The bifurcated fiber unit splits the light beam from the reflected illumination in two to illuminate the workpiece in oblique.*
- *Light source: Halogen bulb (12V, 50W)*

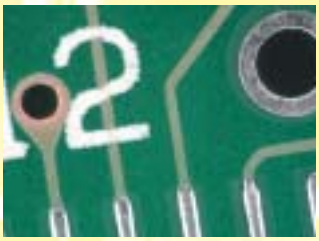
Order No. 176-351-5



Fiber-optic ring light illumination

The halogen light emits light in a ring form surrounding the objective lens. Allows observations with very little influence of the shadows caused by the surface texture of the workpiece. Provides excellent color reproduction and is suitable for vision measurements.

LED circular illumination



The LED light emits light in a ring form surrounding the objective lens. High-luminance, small size, long-life, and low energy consumption. Provides high image contrasts, especially in the observations of resins, substrates, and small cylindrical workpieces. Also suitable for vision measurements.*

** The life of the LED light tends to be shorter in a high operating temperature. The recommended light volume for brightness is approximately 50%.*

- ***0.6mm Microdrill (using LED circular illumination)***

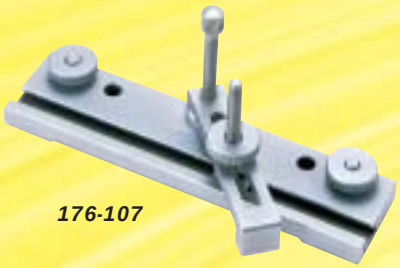
white

green

Note: *The workpiece images on this page were shot with a digital camera system used in conjunction with the MF-A..*

Workpiece Fixtures

Holder with clamp



176-107

- *Maximum workpiece height: 35mm (1.38")*
- *Mass: 0.4kg (.88 lbs.)*
- *Needs T-groove mount adapter (**176-304**) for 200x170mm (8"x7") and 300x170mm (12"x7") microstages (**176-310**) for 200x100mm (8"x4") microstage*

Swivel center support

172-197

- *Supports a workpiece that has a center hole at both ends. The workpiece on this support can be tilted up to ±10° for precision measurement of screws, etc.*
- *Max. workpiece diameter: 80mm (3.15")*
- *Max. workpiece length: 140mm (5.51")*
- *Mass: 2.5kg (5.5 lbs.)*
- *Needs T-groove mount adapter (**176-304**) for 200x170mm (8"x7") and 300x170mm (12"x7") microstages (**176-310**) for 200x100mm (8"x4") microstage*

V-block with clamp

172-378

- *Maximum workpiece diameter: 25mm (.98")*
- *Mass: 0.8kg (1.76 lbs.)*
- *Needs T-groove mount adapter (**176-304**) for 200x170mm (8"x7") and 300x170mm (12"x7") microstages (**176-310**) for 200x100mm (8"x4") microstage*

Rotary tables

176-305

- *Table top diameter: 240mm (9.45")*
- *Grass stage diameter: 183mm (7.2")*
- *Rotation range: 360°*
- *Mass: 5.5kg (12.1lbs.)*
- *Only for 50x50mm(2"x2") and 100x100mm (4"x4") microstage*
- *Can be fixed V-block with clump, Swivel center support or Holder with clump on the table.*

176-306

- *Table top diameter: 410mm (16.14")*
- *Grass stage diameter: 240mm (9.45")*
- *Rotation range: 360°*
- *Mass: 6.5kg (14.3 lbs.)*
- *Only for 200x170mm (8"x7") and 300x170mm (12"x7") microstages*

T-groove mount adapter

176-304
176-310

- *Secures any of the following fixtures on the 200x170mm (8"x7") and 300x170mm (12"x7") microstages. (**176-304**)/on the 200x100mm (8"x4") microstages. (**176-310**)*
- *Applications:*
  *Rotary table (**176-306**)*
  *Swivel center support (**172-197**)*
  *V-block with clamp (**172-378**)*
  *Holder with clamp (**176-107**)*

Color filters

12AAA646 *LB80*
12AAA643 *ND2*
12AAA644 *ND8*
12AAA645 *GIF*

- *Used with the transmitted illuminator of the microscope.*

Lens cleaning kit

12AAA165

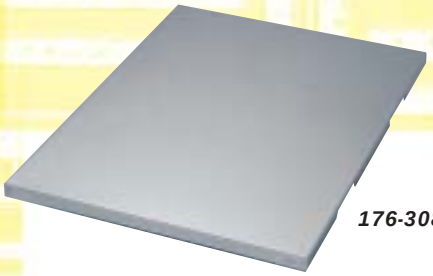
- *For mentenance of eyepieces and objectives*

External printer

02AGD600A: *with 100V AC adapter*
02AGD600B: *with 120V AC adapter*
02AGD600C: *with 230V AC adapter*

- *Connects with the XY or XYZ counter via RS-232C interface to print the display values.*
- *Needs a foot switch (**12AAA846**) to trigger the data input.*
- *Printer paper (**223663**, 10-roll set).*

Vibration damping stage



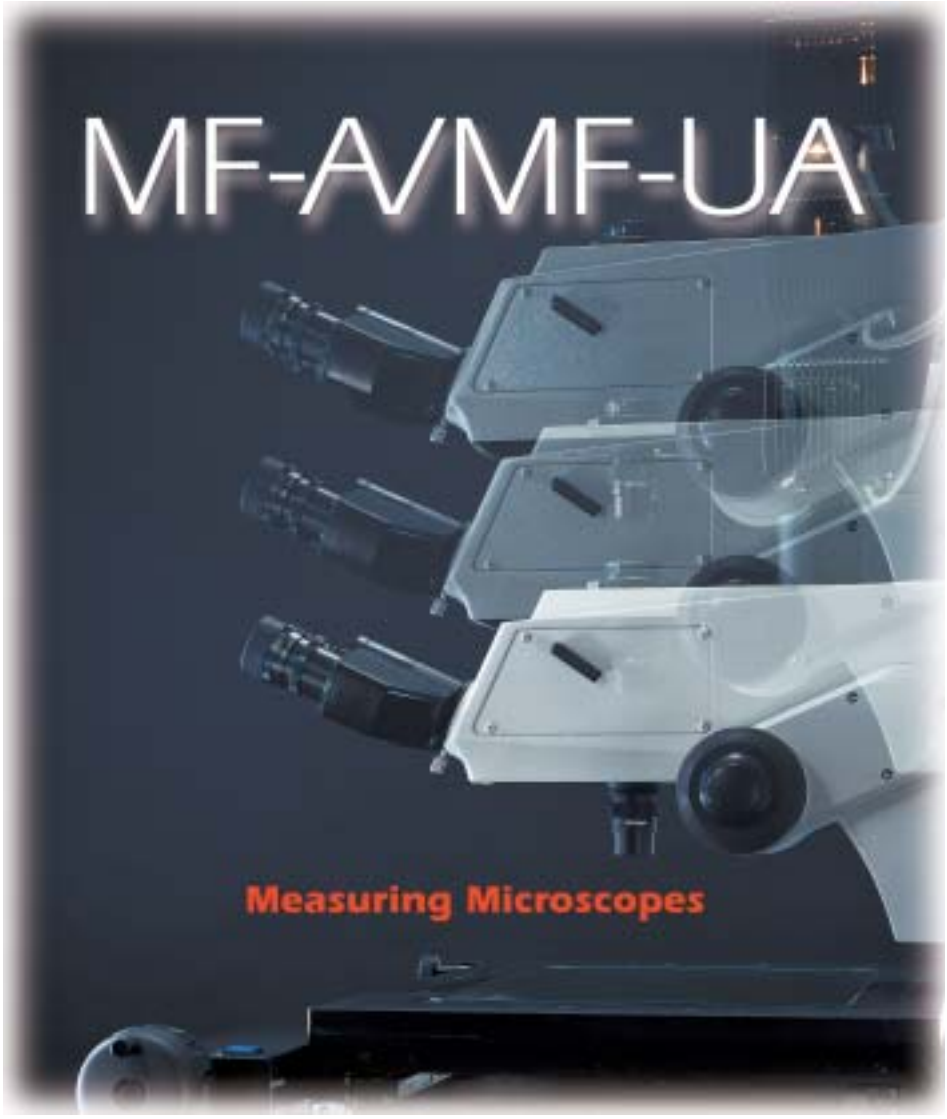
176-308

- *Dimention: 750x550x36mm (30"x22"x1.4")*
- *Mass: 36kg (79.2 lbs.)*
- *Maximun lading weight: 200kg (440 lbs.)*

Machine stand

176-309

- *Dimention: 1200x900x650mm (47.2"x35.4"x25.6")*
- *Mass: 50kg (110 lbs.)*
- *Maximun lading weight: 300kg (660 lbs.)*



Mitutoyo
PRECISION IS OUR PROFESSION

JSA
JSAQ-052
ISO 9001

Mitutoyo Corporation
20-1, Sakado 1-Chome, Takatsu-ku, Kawasaki-shi,
Kanagawa 213-0012, Japan
Phone (044)813-8230 Fax (044)813-8231
http://www.mitutoyo.co.jp

Specifications are subject to change without notice.

Printed in Japan
128.000210 (7) BFP